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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/032,687	12/28/2001	Hyung Kyun Kim	29936/38063	7293
4743	7590	10/03/2003	EXAMINER	
MARSHALL, GERSTEIN & BORUN LLP			GUERRERO, MARIA F	
6300 SEARS TOWER			ART UNIT	
233 S. WACKER DRIVE			PAPER NUMBER	
CHICAGO, IL 60606			2822	

DATE MAILED: 10/03/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/032,687

Applicant(s)

KIM ET AL.

Examiner

Maria Guerrero

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 June 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

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DETAILED ACTION

1. This Office Action is in response to the Request for continued examination and the Amendment filed September 2, 2003.

Claim 5 is canceled.

Claims 1-4 are pending.

Continued Examination Under 37 CFR 1.114

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on September 2, 2003 has been entered.

Priority

3. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

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Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant Admitted Prior art in view Harakawa (JP 07-183513) (Translation) and Beinglass et al. (U.S. 5,932,286).

Applicant Admitted Prior art teaches forming a polysilicon layer on an insulating film formed on a semiconductor substrate, forming a metal layer on the polysilicon layer, depositing a nitride layer on the metal layer, and patterning the nitride layer to form a hard mask (Fig. 1A-1B, page 2). Applicant Admitted Prior art discloses patterning the metal layer and the polysilicon layer using the patterned hard mask (Fig 1C, page 2). Applicant Admitted Prior art teaches depositing a nitride film by low-pressure chemical vapor deposition, and etching the nitride film to form a spacer at a sidewall of the patterned metal layer, the patterned polysilicon layer, and the patterned hard mask (Fig. 1D, pages 2-3). Applicant Admitted Prior art shows the specific stress of the silicon nitride film formed by LPCVD (Fig. 2, page 3)

Applicant Admitted Prior art does not specifically teach depositing the nitride layer having similar stress characteristics with the hard mask layer by a low-pressure chemical vapor deposition, the hard mask having the specific thickness as claimed. However, Harakawa teaches depositing the nitride film by low-pressure chemical vapor

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deposition and the nitride (hard mask) having a thickness of 100 nm (1000 Angstroms) (Translation, paragraph 0011-0013).

Applicant Admitted Prior art fails to show using a single type chamber having a temperature of 600° C to 800° C and a pressure of 1 Torr to 500 Torr. Applicant Admitted Prior art fails to show using a batch type chamber having a temperature of 600° C to 800° C a pressure of 0.1 Torr to 1 Torr. However, Beinglass et al. shows depositing silicon nitride using the single type chamber having a temperature of 750° C and a pressure of 5 Torr to 100 Torr (col. 2, lines 33-55). Beinglass et al. also shows low pressure chemical vapor deposition process for the deposition of silicon nitride layers are well known in the art employing a batch-type processing chamber having a pressure of about 300 millitorr (col. 1, lines 10-16).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Applicant Admitted Prior art by including the step of depositing the nitride layer by low-pressure chemical vapor deposition and specifying the thickness as taught Harakawa and specifying the single type of chamber, the pressure, and the temperature as taught Beinglass et al. in order to reduce processing time. The modification would provide highly uniform silicon nitride films (Beinglass et al., col. 2, lines 19-20). In addition, a person of ordinary skill in the art would recognize that the nitride layer would have similar stress characteristics with the hard mask layer because both would be formed with the conventional low-pressure chemical vapor deposition.

Response to Arguments

5. Applicant's arguments with respect to claims 1-4 have been considered but are moot in view of the new ground(s) of rejection.


Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Song et al. (U.S. 6,451,691) is cited as evidence to show that forming a silicon nitride hard mask and silicon nitride spacers by Low Pressure Chemical Vapor Deposition is well known in the art.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maria Guerrero whose telephone number is 703-305-0162.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 703-308-4905. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.


Maria Guerrero
Patent Examiner
September 20, 2003